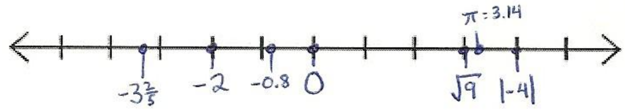
Algebra Post-Assessment

Name SOLUTIONS

Graph and label each of these numbers on the number line provided:

$\left\{0,\ -2,\ \frac{3}{4},\ -0.8, |-4|,\ \sqrt{9},\ -3\frac{2}{5},\ \pi\right\}$



Perform the following operations, simplifying where necessary:

$7-(-10)=$

$7 + 10 = \boxed{17}$

$-5\cdot 20 = \boxed{-100}$

$2^5 =$

$\underbrace{2\cdot 2\cdot 2}_{8}\cdot\underbrace{2\cdot 2}_{4} = \boxed{32}$

$6\sqrt{2}\cdot\sqrt{2} =$

$6\cdot\left[2^{1/2}\cdot 2^{1/2}\right]$

$6\cdot\left[2^{1/2+1/2}\right] = 6\cdot\left[2^1\right] = \boxed{12}$

$\frac{1}{3}+\frac{7}{8}=$

$3\cdot 8 = 24$

$\times 8 \quad \times 3$

$\frac{8}{24} + \frac{21}{24} = \boxed{\frac{29}{24} \text{ or } 1\frac{5}{24}}$

$\frac{6}{5}\cdot\frac{3}{8} = \frac{6\cdot 3}{5\cdot 8} = \frac{18}{40} = \boxed{\frac{9}{20}}$

$\frac{9.6\times 10^4}{3.2\times 10^{-2}} =$

$\left(\frac{9.6}{3.2}\right)\times\left(\frac{10^4}{10^{-2}}\right) = (3)\times\left(10^{4-(-2)}\right) = \boxed{3\times 10^6 \text{ or } 3{,}000{,}000}$

$\frac{0}{12} = \boxed{0}$

$-2[\,5(6\div 3)+8-4^2\,] =$

$-2[5(2) + 8 - 16]$

$-2[10 + 8 - 16] = -2[2] = \boxed{-4}$

$(3n-1)^2 =$

$(3n-1)(3n-1) = 3n(3n-1) - 1(3n-1)$

$= 9n^2 - 3n - 3n + 1 = \boxed{9n^2 - 6n + 1}$

What is the greatest common factor of the numbers 20 and 48?

20 : 1 · 20, 2 · 10, 4 · 5

48 : 1 · 48, 2 · 24, 3 · 16, 4 · 12, 6 · 8

a. 2
b. 3
c. 4
d. 6
e. none of the above

Which of the following numbers is *not* prime?

a. 17 – prime
b. 41 – prime
c. 71 – prime
d. 77 7 · 11
e. none of the above

What is the correct prime factorization of 36?

a. $3\cdot 6$
b. $6\cdot 6$
c. $2\cdot 2\cdot 3\cdot 3$
d. $2\cdot 3\cdot 4\cdot 6\cdot 9\cdot 12\cdot 18$
e. none of the above

36 → 2, 18; 18 → 2, 9; 9 → 3, 3

Factor this quadratic function into two binomials, then find the two x-intercepts and one y-intercept.

$f(x) = x^2 + 6x - 16$

+ – or – +

16 : 1 · 16, 2 · 8, 4 · 4

$(x-2)(x+8)$

When $y = f(x) = 0$:

$0 = x - 2 \qquad 0 = x + 8$

$x = 2 \qquad x = -8$

$(2, 0) \qquad (-8, 0)$

When $x = 0$:

$y = 0^2 + 6\cdot 0 - 16$

$y = -16$

$(0, -16)$

Find the point (x, y) where these two linear equations intersect.

① $5x + 2y = 8$

② $-2x + y = -5$

solution intersection $\boxed{(2, -1)}$

SUBSTITUTION

Solve ② for y:

$-2x + y = -5$

③ $y = 2x - 5$

Substitute ③ into ①:

$5x + 2y = 8$

$5x + 2(2x-5) = 8$

$5x + 4x - 10 = 8$

$+10 \quad +10$

$\frac{9x}{9} = \frac{18}{9}$

$x = 2$

② $-2(2) + y = -5$

$y = -1$

ELIMINATION

$5x + 2y = 8$

$-2\{-2x + y = -5\}$

Multiply ② by –2 to eliminate y:

$5x + 2y = 8$

$+4x - 2y = +10$

combine

$9x = 18$

$x = 2$

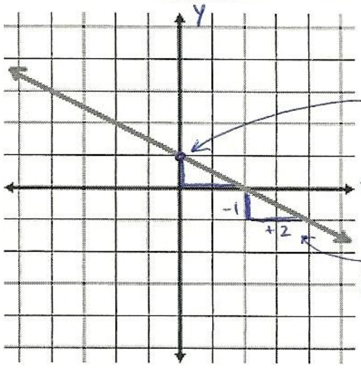
$5(2) + 2y = 8$

$\frac{2y}{2} = \frac{-2}{2}$

Algebra Post-Assessment (page 2)

Write the equation of the graphed line in slope-intercept form.

$\boxed{y = -\frac{1}{2}x + 1}$



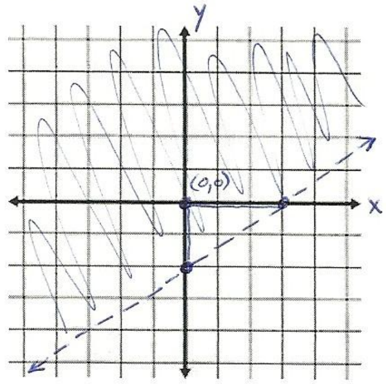
y-intercept at 1

slope $= -\frac{1}{2}$ $\left[\frac{\text{vertical change}}{\text{horizontal change}}\right]$

Graph this linear inequality: $2x - 3y < 6$
(Remember to indicate all solution points)

↳ any points in shaded area

Evaluate when $x=0$ and $y=0$
$2(0) - 3(0) < 6$
$0 < 6$
true, so $(0,0)$ is a solution



$2x - 3y < 6$
$-2x \qquad -2x$

$\frac{-3y}{-3} < \frac{-2x+6}{-3}$

* switches sign

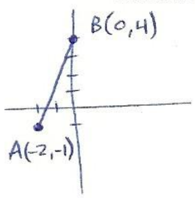
$\boxed{y > \frac{2}{3}x - 2}$

slope : $\frac{2}{3}$

y-intercept : -2

$>$: dotted line

Calculate the slope and the distance of the line between these two points: $A(-2,-1)$ $B(0,4)$



$x_1 \quad y_1 \qquad x_2 \quad y_2$

slope $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-(-1)}{0-(-2)} = \frac{4+1}{0+2} = \boxed{\frac{5}{2}}$

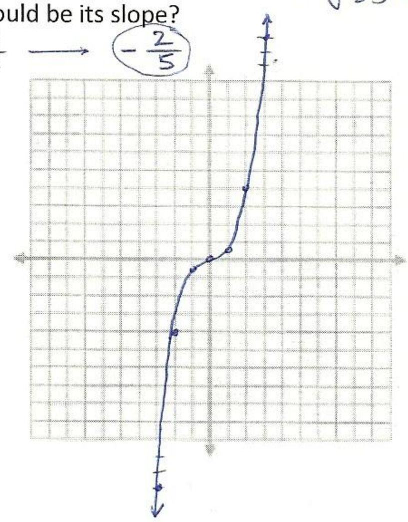
distance $= \sqrt{(y_2-y_1)^2 + (x_2-x_1)^2} = \sqrt{(4+1)^2 + (0+2)^2} = \sqrt{5^2 + 2^2} = \sqrt{25+4} = \boxed{\sqrt{29}}$

-- If there was a line perpendicular to this line above, what would be its slope?

↳ opposite reciprocal slope $+\frac{5}{2} \longrightarrow -\frac{2}{5}$

Fill in the table of values and then graph this function: $g(x) = \frac{x^3}{2}$

x	-3	-2	-1	0	1	2	3
$g(x)$	-13.5	-4	-½	0	½	4	13.5



$\frac{(-3)^3}{2} = -\frac{27}{2} = -13.5$ $\qquad \frac{(-1)^3}{2} = -\frac{1}{2}$

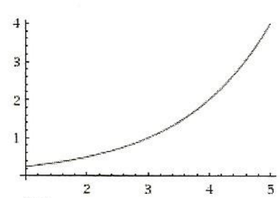
$\frac{(-2)^3}{2} = -\frac{8}{2} = -4$ $\qquad \frac{(2)^3}{2} = \frac{8}{2} = 4$

Match each graph to its corresponding function:

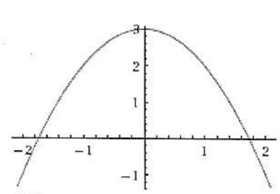
A $f(x) = 2^{(x-3)}$

C $g(x) = 3\sin(x) - 2$

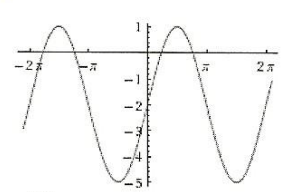
B $h(x) = -x^2 + 3$



(A)



(B)



(C)

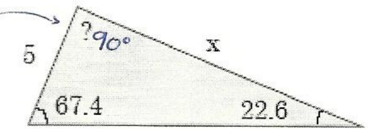
Algebra Post-Assessment (page 3)

Calculate the unknown angle and side length of this triangle.

All angles add to 180 : $180 - 67.4 - 22.6 = ?$

$180 - 90 = ?$

$90 = ?$



Since now we know this is a right triangle, we can use the Pythagorean theorem:

$5^2 + x^2 = 13^2$

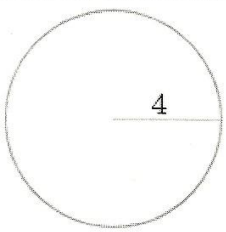
$x^2 = 13^2 - 5^2$

$x^2 = 169 - 25$

$\sqrt{x^2} = \sqrt{144}$

$\boxed{x = 12}$

Calculate the circumference and area of this circle. [Remember that $\pi \approx 3.14$ or 22/7]



Circumference $= \pi \cdot$ diameter

$= \pi \cdot 2 \cdot$ radius

$= \pi \cdot 2 \cdot 4$

$= \pi \cdot 8$

$3.14 \times 8 = 25.12$

circumference $\approx \boxed{25.1}$

Area $= \pi \cdot r^2$

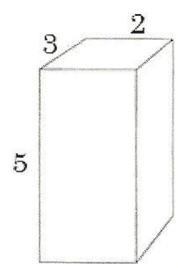
$= \pi (4)^2$

$= \pi \cdot 16$

$\boxed{\text{area} \approx 50.2}$

3.14×16: $1884 + 3140 = 50.24$

Calculate the volume and surface area of this rectangular prism.



Volume = length × height × width

$= 2 \times 5 \times 3$

$V = \boxed{30}$

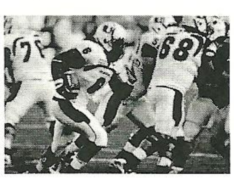
Surface Area

2x (2 by 5: 10) 2x (3 by 5: 15) 2x (3 by 2: 6)

$2(10) + 2(15) + 2(6) = 20 + 30 + 12 = \boxed{62}$

Translate the following numerical expression into an English statement (spell all numbers 10 --> "ten"):

$2x^3 + \frac{3}{4}y \geq \sqrt{26}$ "Two x cubed plus three-fourths y is greater than or equal to the square root of twenty-six."



There are several ways to score points in American football.
The most common ways are:
Field goal (3 pts): to kick the ball through the upright posts
Touchdown (7 pts total): to run/pass the ball into the endzone then kick an extra point
(If you are familiar with football, we will ignore 2-point safeties and conversions here.)

Using only point combinations of a field goal (3 points) and a touchdown (7 points),
What is the *highest* point total a football team *cannot* score?
[ex. a team can't score 5 points, but they can score 6 points with two field goals]

		can't score
3 →	3	1
3+3 =	6	2
7 →	7	4
3+3+3 =	9	5
7+3 =	10	8
3+3+3+3 =	12	$\boxed{11}$ * highest point total a team cannot score under these conditions.
7+3+3 =	13	
7+7 =	14	
3+3+3+3+3 =	15	

13, 14, 15 } this pattern will continue covering all possible scores